

# **FCC Guidance for Measuring the Output Power of Transmitting Devices Operating within the Medical Device Radiocommunication Service**

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## **Background**

A recent FCC rulemaking established a new Medical Device Radiocommunication Service (MedRadio Service) under Part 95 (Subpart I) of the Commission's rules.<sup>1</sup> The MedRadio Service will accommodate the operation of body-worn as well as implanted advanced wireless devices intended for medical diagnostic and therapeutic purposes in humans.

This paper provides an acceptable measurement procedure for demonstrating compliance of a MedRadio device to the fundamental output power limit.

## **Measurement Procedure**

Although the precise waveform characteristics associated with a MedRadio Service transmission are not yet known, it is known that a digital vector modulation scheme (likely a variation of m-PSK or m-QAM) will be used to transmit non-voice data over a carrier frequency located within the 401-406 MHz frequency band. There is no channel plan associated with the MedRadio operating band, but the rules limit the maximum emission bandwidth (EBW), relative to the -20 dB points, to 300 kHz (the maximum allowable emission bandwidth ranges from 100 to 300 kHz, depending on the specific carrier frequency used).

The following procedure is intended to produce accurate and repeatable measurement of the peak power (maximum average over the burst duration) over the emission bandwidth of a MedRadio transmitter, independent of the specific digital modulation scheme selected. This procedure assumes the use of a modern spectrum analyzer or vector signal analyzer with digital signal processing (DSP) analysis capabilities. Alternatively, an average power meter can be used to produce analogous results when used to measure the fundamental output power of a MedRadio transmitter.

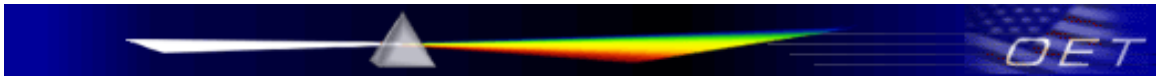
The MedRadio device must be configured to transmit continuously at maximum power over the measurement duration.<sup>2</sup>

1. Tune analyzer frequency to the nominal center frequency of the EBW<sup>3</sup>.
2. Set the frequency span to 2 x EBW.
3. Set the resolution bandwidth (RBW) to 1-3% of the EBW.
4. Set the video bandwidth (VBW) to  $\geq 3 \times$  EBW.
5. Select the average power (RMS) display detector.<sup>4</sup>

<sup>1</sup> Report and Order FCC 09-23, Released March 20, 2009.

<sup>2</sup> This may require a special test mode or other coordination with the manufacturer.

<sup>3</sup> Referenced to the -20 dB points.



6. Set the number of measurement points to  $\geq 1001$ .
7. Use auto-coupled sweep time.
8. Perform measurement over an interval of time when the transmission is continuous and at its maximum power level.<sup>5</sup>
9. Utilize trace averaging over 100 traces in the power averaging (*i.e.*, RMS) mode.
10. Use the Channel/Band Power function to determine the integrated power over the EBW.
11. Record the band power level.
12. Adjust the measured level by applying appropriate correction factors for the measurement set-up (*e.g.*, antenna gain, cable losses, pre-amplifier gain, external attenuation, etc.).



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<sup>4</sup> The use of an RMS power detector is preferred but if not available, the use of a Sample detector is acceptable.

<sup>5</sup> The digital data sequence(s) over which the power is measured shall be representative of those encountered during normal system operation.